



WILSON, PENLAND

LIMITING SET POINT THERMOSTAT STUDY

A Community Energy Management Program Report



Energy
Ontario

MIDLAND/PENETANG
LIMITING SET POINT THERMOSTAT STUDY

Undertaken jointly by the Ontario
Ministries of Municipal Affairs &
Housing and Energy under the
Community Energy Management Program
(C.E.M.P.)

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by

Research and Development Section

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SUMMARY

This report was initiated to evaluate the validity of limiting set point thermostats as an economical means of conserving energy in low density public housing.

The investigation was based on the following assumptions:

- o A certain proportion of public housing's energy cost is uncontrolled and excessive.
- o Tenants who live in subsidized and rental accommodation have very little incentive to conserve energy.

Two (2) types of limiting thermostat devices were installed to conserve energy in a field sample consisting of ten (10) houses.

The breakdown of limiting devices was as follows:

- o Three (3) in-duct limiters (upper limit of 23.3°C - 74°F)
- o Seven (7) limited set point thermostats (upper limit of 23.9°C - 75°F).

Tenant complaints in two (2) houses subsequently resulted in their elimination from the study.

An information review on the remaining eight (8) houses included a comparative evaluation of gas consumption data for November-March BEFORE (1980-1981) and AFTER (1981-1982) limiting thermostat installations, user survey and energy audit survey.

Based on this study, the following three major conclusions were drawn:

- o Limiting thermostats have the potential for allowing management to set upper interior temperature limits, and for controlling excessive temperature demands with average percentage decrease in total consumption of (-5.5%), a savings of \$28.31 and a payback in the range of from two to three years.
- o A number of anomalies appeared in the test results, indicating that a larger sample would give more reliable data on which savings could be calculated.
- o A greater degree of awareness and participation by the tenants would be welcome to ensure the success of the demonstration.

INTRODUCTION

This study was undertaken to explore the suitability of thermostat control devices with upper temperature limits to conserve energy in low density public housing. The investigation was based on the premise that some proportion of public housing energy cost is due to uncontrolled and thus excessive space heating.

The residents living in subsidized housing and rental accommodation have very little incentive to conserve energy, especially when heating costs are already included in the monthly rental. Due to lack of proper incentives, Property Management has great difficulty in achieving the desired conservation measures through the tenants.

The concept of LIMITING THERMOSTAT DEVICES (IN-DUCT LIMITERS AND SET POINT THERMOSTATS) evolved as a potentially economical means of conserving heat consumption in residential construction by limiting the upper inside temperature of the house. Detailed explanations of IN-DUCT LIMITERS and SET POINT THERMOSTATS are contained in Appendix I (page 10).

To explore this energy conservation potential, ten (10) houses were identified as high energy users and field tested with these devices.

Two (2) houses were eliminated from the study because of tenant complaints, resulting in removal of the devices. Results were therefore analyzed from the remaining eight (8) houses.

The following is a breakdown of the type of limiting device and installation location:

In-Duct Limiters

- Upper limit of 23.3°C (74°F)
22 Gignac Drive,
252 Seventh Street,
818 Dominion Avenue,

Limited Set Point Thermostats

- Upper limit of 23.9°C (75°F)
10 Gignac Drive,
14 Gignac Drive,
16 Gignac Drive,
353 Borden Crescent,
294 Yonge Street,

DATA ANALYSIS

November to March was selected as a representative sample period to get some comparison, but does not represent the complete heating season. Natural gas consumption figures were tabulated on eight (8) remaining test houses from November 1980 to March 1981 as indicators of consumption BEFORE the installation of the limiting thermostat devices (See Table I, page 4). This information was compared to gas consumption data from November 1981 to March 1982 as indicators of consumption AFTER the installation of the limiting thermostat devices (See Table 2, page 5).

A comparative evaluation of Tables 1 and 2 revealed the following observations:

- o The average percentage decrease in total consumption attributable to these devices was (-5.5%) m³/degree day, and a saving of \$28.31. The average decrease in consumption, excluding the three (3) potential extraneous results, (+7.4%) 14 Gignac Drive, (+5.0%) 22 Gignac Drive and (-28%) 353 Borden Crescent, was (-5.7%) m³/degree day, and a saving of \$24.38.
- o The percentage decrease in total consumption ranged from (-1.0% to 10.2%) excluding the three (3) anomalies, a saving of \$3.13 to \$37.52.
- o In-Duct Limiters (I.D.L.) averaged a (-3.0%) m³/degree day decrease in total gas consumption, a saving of \$10.22. The average consumption reduction, excluding the anomaly 22 Gignac Drive (+5.0%) was (-6.9%) m³/degree day, a saving of \$25.02.
- o Limited Wall Mounted Set Point Thermostats (L.S.P.T.) averaged a (-7.1%) m³/degree day decrease in total gas consumption, a saving of \$47.04. The average reduction, excluding the two (2) anomalies (+7.4%) 14 Gignac Drive and (-28.0%) 353 Borden Crescent, was (-5.0%) m³/degree day, a saving of \$23.97

TABLE 1: Summary of Natural Gas Consumption from November, 1980 to July, 1981 before limiting thermostat installations.

DWELLING LOCATION	BILLING PERIOD November, 1980 to March, 1981	TOTAL CONSUMPTION (m ³)	DEGREE DAY °C	NET CONSUMPTION (m ³ /DEGREE DAY)
1. 818 Dominion Ave.	10/11/80 to 09/03/81	1663	2901	.573
2. 252 Seventh Street	10/11/80 to 09/03/81	1701	2901	.586
3. 10 Gignac Drive	11/11/80 to 10/03/81	2267	2900	.782
4. 14 Gignac Drive	11/11/80 to 10/03/81	2504	2900	.865
5. 16 Gignac Drive	11/11/80 to 10/03/81	2451	2900	.845
6. 22 Gignac Drive	11/11/80 to 10/03/81	1809	2900	.623
7. 353 Borden Cres.	07/11/80 to 06/03/81	2738	2900	.944
8. 294 Yonge Street	10/11/80 to 09/03/81	2058	2901	.709

Table 2: Summary of natural gas consumption from November, 1981 to March, 1982 after limiting thermostat installations.

DWELLING LOCATION AND TYPE OF THERMOSTAT DEVICE	BILLING PERIOD (NOVEMBER, 1981 to MARCH, 1982)	TOTAL CONSUMPTION (m ³)	DEGREE DAYS °C	NET CONSUMPTION IN (m ³ / DEGREE DAY)	PERCENTAGE DECREASE (-) (1980-81) to (1981-82)	CONSUMPTION DIFF. FROM (1980-1981) TO (1981-1982)
1. 818 Dominion Avenue (I.D.L.)	10/11/81 to 11/03/82	1646	2978	.553	-3.5%	-.02
2. 252 Seventh Street (I.D.L.)	10/11/81 to 11/03/82	1565	2978	.526	-10.2%	-.06
3. 10 Gignac Drive (L.S.P.T.)	11/11/81 to 12/03/82	2313	2977	.777	-1.0%	-.005
4. 14 Gignac Drive (L.S.P.T.)	11/11/81 to 12/03/82	2766	2977	.929	+7.4%	* +.064
5. 16 Gignac Drive (L.S.P.T.)	11/11/81 to 12/03/82	2321	2977	.780	-7.7%	-.065
6. 22 Gignac Drive (I.D.L.)	11/11/81 to 12/03/82	1947	2977	.654	+5.0%*	+.031*
7. 353 Borden Cr. (L.S.P.T.)	09/11/81 to 10/03/82	2032	2979	.682	-28.0%	-.262
8. 294 Yonge Street (L.S.P.T.)	10/11/81 to 11/03/82	1978	2978	.664	-6.3%	-.045

NOTES:

1. I.D.L. denotes in-duct limiter and L.S.P.T. denotes limiting set point thermostat.
2. Percentage decrease and consumption difference are expressed in m³/Degree Day.
3. * Denotes increase in consumptions.

- o The cost analysis Appendix IV disclosed paybacks of 2.9 years and 1.8 years respectively for In-Duct Limiters and Limited Set Point Thermostats, based on November-March time frame. However, the payback durations would decrease based on a yearly heating season.

Net gas consumption levels of the individual test houses (1980-1981) and (1981-1982) are ranked in descending order in Appendix II, page 15.

In reviewing the findings of Appendix II, the following observations were made:

- o The relative position of 353 Borden Crescent changed substantially from worst (1st of 8, 1980-81) to middle of sample (4th of 8, 1981-1982) with (-28.0%) decrease in consumption.
- o The total gas consumption increased for 14 Gignac Drive (+7.4%) and 22 Gignac Drive (+5.0%) after the limiting thermostat installations.
- o 10, 16 Gignac Drive, traditionally maintained high gas consumption levels and their relative positions in the sample varied little over the study period.
- o 294 Yonge Street, 818 Dominion Avenue and 252 Seventh Street, ranking position varied little in the sample after the limiting device installations.

Greater detail on the performance ranking of the individual test houses, based on percentage of total gas consumption, can be found in Appendix III, Page 17.

ON-SITE OBSERVATIONS

Two (2) surveys were conducted during this study, one a Resident Energy Survey, (Appendix V, page 20), and the other an Energy Audit, completed by a Ministry representative during the site visit, (Appendix VI, page 23).

USER SURVEY

The salient findings of the USER ENERGY SURVEY are summarized in Appendix VII, page 25. They are as follows:

- o 80% of the tenants on average reported that they regularly practised energy conservation in the homes.
- o Nearly 50% of the tenants expressed negative feelings toward the limiting device installed in their heating systems.
- o 48% of the residents found their homes drafty, with high levels of air infiltration.
- o Over 80% of the occupants kept their windows closed during the heating season.
- o 90% of the tenants replied that they did not use any alternate supplementary means of heating.

Since the tenants were identified as heavy energy users, the high degree of affirmative answers makes these suspect.

ENERGY AUDIT SURVEY

The salient findings of the ENERGY AUDIT SURVEY are summarized in Appendix VIII, page 26, and the overall survey observations are documented in Appendix IX, pages 27-40.

The results are as follows:

- o 14, 16 Gignac were three-storey, 5-bedroom homes, and therefore had higher overall gas consumption figures, especially after the test period (Tables 1 and 2), in relation to the other homes.

- o Orientation (NW/SE) and barren topography of Gignac homes are such that prevailing winds may have influenced the higher gas consumption levels. Home at 22 Gignac is lower than the rest, but this might be due to the fact that it is a 2-bedroom home, while the other is a larger 3-bedroom.
- o The Borden Crescent residence is perhaps another case in point, where prevailing winds and lack of landscape projection could have affected the total gas consumption.
- o The geographic location in the case of 294 Yonge Street, 818 Dominion Avenue and 252 Seventh Street appears to have been a favourable location not subject to the severity of winds because of heavily treed lots.
- o Hot water heaters in this assessment were subjected to exceptionally hard water. It is surmised that scale build up on the heating elements caused an insulating effect which wasted energy.
- o Window air leakage and drafts from general sources were mentioned frequently in conversation, and would have contributed to increased levels of energy consumption.
- o Leaky taps observed in the Gignac homes were another potential minimal source of energy loss.
- o Most homes on Gignac Drive complained of freezing pipes in the winter, which might be an indicator of air infiltration and thus higher fuel consumption.
- o All furnaces were generally in an unserviced condition prior to seasonal overhaul. It is assumed that this existed through the heating season, and could have contributed to a general increase in consumption of all houses.

CONCLUSIONS

1. Future studies of limiting thermostat installations should include a larger test sample, to provide a more statistically sound sample.

2. Limiting thermostats have the potential for controlling excessive temperature demands and thus controlling energy waste, with average percentage decrease in total consumption of (-5.5%).
3. The percentage decrease in total consumption ranged from (-1.0% to -10.2%) excluding the three (3) anomalies (+7.4%) 14 Gignac Drive, (+5.0%) 22 Gignac Drive and (-28.0%) 353 Borden Crescent.
4. The limited wall set point thermostat (L.S.P.T.), with an average decrease of (-7.1%) out-performed the in-duct limiter (I.D.L.) which averaged a decrease of (-3.0%).
5. In the event an energy conservation device is installed in a unit, the tenant should be made aware that this has been done in order to encourage energy conservation.
6. Increases in consumption levels in 14 Gignac Drive (+7.4%) and 22 Gignac Drive (+5.0%) after the limiting thermostat installations cannot be explained; a larger sample might have reduced these anomalies.
7. From the COST ANALYSIS in Appendix IV, the In-Duct Limiter averaged a payback of 2.9 years, and the Limiting Set Point Thermostat 1.8 years (including installation costs).

APPENDIX I

IN-DUCT LIMITING THERMOSTAT

In-Duct Limiting Thermostats manufactured by P.S.G. Industries were installed in three (3) O.H.C. family housing units, (See Figure 1, page 11). This type of device is more commonly known by the trade name "Accustat". The Duct Limiter is mounted in the return air duct of a forced air heating system, utilizing solid state circuitry and pre-set mercury sensors rather than a bi-metallic coil to control room temperature.

The main component of the accustat limiter is the mercury sensor which functions like a thermometer. As temperature changes, a column of mercury rises or falls in a glass capillary tube. "ON-OFF" switching occurs when the mercury comes in contact with one of two hermetically sealed platinum electrodes positioned across the capillary column (See Figure 2, page 11). In the heating mode, the bottom electrode is common and the top serves as a switching point, turning the heating system off when the mercury comes in contact with it. The mercury sensors are interchangeable and come in a variety of pre-set temperature settings. But for the purposes of this study a 23.3°C (74°F) pre-set sensor was selected as the upper limit. The accustat, wired in series with the existing thermostat, works on the basis that when the room temperature reaches the selected upper limit level, the limiter overrides the primary control and shuts the heating system off.

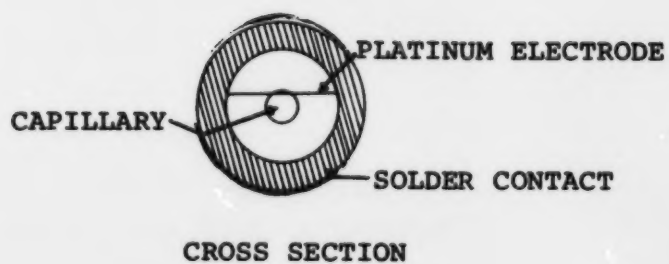
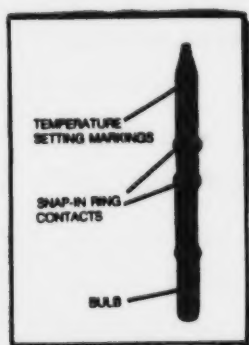
FIGURE 1

- 11 -



IN-DUCT LIMITER

FIGURE 2



MERCURY SENSOR

APPENDIX I

ADVANTAGES

- o Limiting thermostats allow management to set upper temperature limits.
- o Solid state circuitry of all switching functions reduces probability of wear out or malfunction.
- o Potential for less temperature drift in comparison with bimetallic coils which may be prone to metal fatigue, over a period of time.

NOTE:

Adapted from P.S.G. Industries brochure on accustat devices.

APPENDIX I

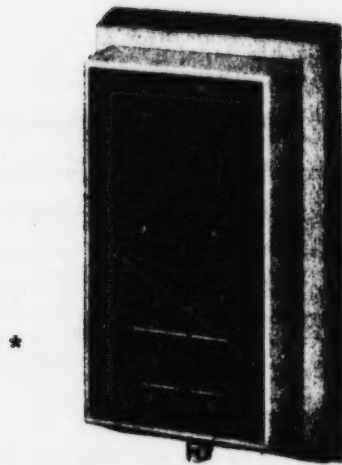
SET POINT THERMOSTAT

Prototype wall mounted limiting set point thermostats supplied by Honeywell were installed in the other five (5) O.H.C. test houses (See Figure 3, page 14). A standard T822 24 volt thermostat was specially modified by limiting the travel of the temperature setting lever within a comfort zone of 15.56°C (60°F) and 23.6°C (75°F), (See Figure 4, page 14). The face plate was also changed to read "MIN - MAX" in lieu of "10.20.30". The wall limiter was mounted directly on a standard vertical outlet box replacing the existing thermostat. These devices functioned on the same principle as a standard thermostat, i.e. a bimetal coil senses a change in temperature and activates a mercury switch, turning the furnace "Off and On" within the preset temperature range.

ADVANTAGES

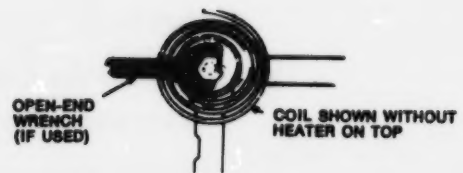
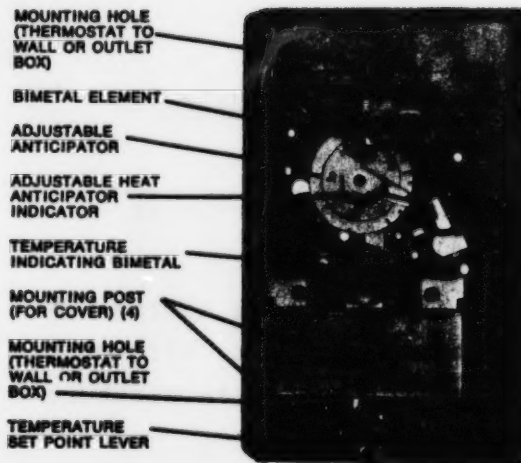
- o Allows management to set upper temperature limits.
- o Thermostats are easily mounted directly on existing electrical outlet boxes.
- o Senses the temperature in the actual living space in lieu of the return air duct, affording the tenant the potential for better temperature control and higher comfort levels.

FIGURE 3



* COVER READS "MIN-MAX" INSTEAD OF "10.20.30"

FIGURE 4



BIMETAL COIL

INTERNAL VIEW OF MERCURY
SWITCH THERMOSTAT

APPENDIX II

PERFORMANCE SUMMARY OF NET CONSUMPTION FROM NOVEMBER 1980 TO
MARCH 1981. (BEFORE LIMITING THERMOSTAT INSTALLATIONS)

<u>DWELLING LOCATION</u>	(DESCENDING ORDER) <u>NET CONSUMPTION</u> <u>m³/DEGREE DAY</u>
1. 353 Borden Crescent	.994
2. 14 Gignac Drive	.865
3. 16 Gignac Drive	.845
4. 10 Gignac Drive	.782
5. 294 Yonge Street	.709
6. 22 Gignac Drive	.623
7. 252 Seventh Street	.586
8. 818 Dominion Avenue	.573

APPENDIX II

PERFORMANCE SUMMARY OF NET CONSUMPTION FROM NOVEMBER 1981
TO MARCH 1982 (AFTER LIMITING THERMOSTAT INSTALLATIONS)

<u>DWELLING LOCATION</u>	<u>NET CONSUMPTION</u> <u>m³/DEGREE DAY</u>
1. 14 Gignac Drive (L.S.P.T.)	.929
2. 16 Gignac Drive (L.S.P.T.)	.780
3. 10 Gignac Drive (L.S.P.T.)	.777
4. 353 Borden Crescent (L.S.P.T.)	.682
5. 294 Yonge Street (L.S.P.T.)	.664
6. 22 Gignac Drive (I.D.L.)	.654
7. 818 Dominion Avenue (I.D.L.)	.553
8. 252 Seventh Street (I.D.L.)	.526

APPENDIX III

RANKING OF PERCENTAGE GAS CONSUMPTION FROM NOVEMBER 1980
TO MARCH 1981 TO NOVEMBER 1981 TO MARCH 1982

<u>DWELLING LOCATION</u>	<u>PERCENTAGE GAS CONSUMPTION VALUE IN m³/DEGREE DAY (DESCENDING ORDER)</u>
1. 353 Borden Crescent (L.S.P.T.)	-28.0
2. 252 Seventh Street (I.D.L.)	-10.2
3. 16 Gignac Drive (L.S.P.T.)	-7.7
4. 294 Yonge Street (L.S.P.T.)	-6.3
5. 818 Dominion Avenue (I.D.L.)	-3.5
6. 10 Gignac Drive (L.S.P.T.)	-1.0
7. 22 Gignac Drive (I.D.L.)	+5.0
8. 14 Gignac Drive (L.S.P.T.)	+7.4

APPENDIX IV

COST ANALYSIS

INSTALLATION CHARGE (1981)

Total installation cost of 10 Limiters	= \$ 178.66
Estimated cost of installing 4 In-Duct Limiters 4 x \$25.00	= \$ 100.00
Estimated cost of installing 6 Limiting Set Point Thermostats 6 x \$13.11	= \$ 78.66

COST OF IN-DUCT LIMITERS (I.D.L.)

COST/UNIT	= \$43.90
INSTALLATION	= <u>\$25.00/UNIT</u> (Estimated)
<u>TOTAL COST</u>	<u>\$68.90/UNIT INSTALLED</u>

COST OF WALL MOUNTED LIMITING SET POINT THERMOSTATS (L.S.P.T.)

COST/UNIT	= \$30.00 (Estimated)
INSTALLATION	= <u>\$13.11/UNIT</u> (Estimated)
<u>TOTAL COST</u>	<u>\$43.11/UNIT INSTALLED</u>

PAYBACK PERIOD

IN-DUCT LIMITER

Initial cost of Limiter (including installation)	= \$ 68.90
Average percentage savings (from Table 2)	= 5.5%
Average cost of heating consumption (Nov. to March) 2071 m ³ @ \$.21/m ³	= \$ 434.91*
Dollar Savings \$434.91 x 5.5%	= \$ 23.92
PAYBACK	= 2.9 years

* Not a yearly heating season.

LIMITING SET POINT THERMOSTATS

Initial estimated cost of Limiter (including installation)	= \$ 43.11
Average percentage savings (from Table 2)	= 5.5%
Average cost of heating consumption (Nov. to March) $2071 \text{ m}^3 \times \$0.21/\text{m}^3$	= \$ 434.91*
Dollar savings $\$434.91 \times 5.5\%$	= \$ 23.92
PAYBACK	= 1.8 years

* Not a yearly heating season.

NOTE: The payback periods would decrease if the
TOTAL YEARLY AVERAGE heating cost was used
in the calculation.

APPENDIX V

MIDLAND PENETANG LIMITING THERMOSTATS PROJECT

Resident Energy Survey

INTRODUCTION: Good morning/good afternoon _____
I am here on behalf of the North Simcoe and
Orillia Housing Authority. I am interviewing
residents to find out their opinions concerning
this energy conservation project.

ADDRESS:

INTERVIEWER:

- 1) In general, do you regularly practise energy conservation in the home?

not					all
at					the
all	2	3	4		time

- 2) Did this project make you more conscious of energy conservation?

very					not
much					at
more	2	3	4		all

- 3) How do you feel about this variety of involuntary limit to conserve household energy?

strongly					strongly
negative	2	3	4		positive

- 4) Do you find this unit drafty?

not					very
drafty					drafty
at all	2	3	4		

- 5) Do you keep all of your windows closed during the heating season?

closed all					open all
the time	2	3	4		the time

- 6) Do you use any form of supplementary heating?

all the					never
time	2	3	4		

If so what types? _____

- 7) At what temperature do you operate your home during the heating season? _____

- 8) How long have you lived here? _____

- 9) How many people are living in this unit? _____
- 10) What are the numbers in each age group?
0-10 _____ 11-20 _____ 21-40 _____ 41-60 _____ 60+ _____
- 11) Do you have any pets?
Yes _____ No _____
If so how many? _____

Additional Comments:

Thank you for your co-operation.

APPENDIX VI

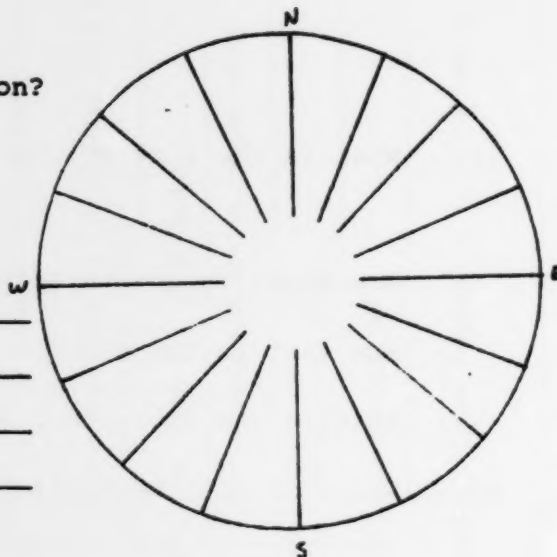
ENERGY AUDIT

Midland Penetang Limiting Thermostats Project

Technical Information:

o Section A: -

- i) What is the building orientation?
- ii) What is the surrounding topography like? (description and photography)



o Section B:

- i) What is the "r" value of insulation in this building?
(if known) _____
- ii) Have insulation upgrades been done recently? (where, when, what) _____
- iii) Have there been any alterations to this building since the study began? (what, where, when)

- iv) What type(s) of windows are there in this building?

o Section C:

- i) What is the hot water heater thermostat set at? _____
- ii) How hot is the D.H.W.? sub: _____
con: _____
air: _____
- iii) What is the size of the furnace? _____

- iv) How clean is the furnace filter? _____
- v) How taut is the furnace fan belt? _____
- vi) What is the thermostat set at? _____
- vii) Where is the thermostat located? _____
(description and photography)

EVALUATION SCALE:	1	3	5
	NEGATIVE	AVERAGE	POSITIVE
	BAD		GOOD

APPENDIX VIII

SUMMARY OF ENERGY AUDIT SURVEY

DWELLING LOCATION and TYPE OF THERMOSTAT DEVICE	No. of Bedrooms	No. of Occupants	Orientation	Landscaping	Insulation Levels (RSl)		D.H.W. Temp. °C.	Type of 1st and 2nd floor windows	D.H.W. Therm Setting	Furnace Filter Condition	Furnace Size in B.T.U.	Furnace Fan Belt Tension	HOUSE KEEPING
					Walls	Ceill							
1) 818 DOMINION AVE. (I.D.L.)	3	3	E/W	Heavily treed	1.7 R10	3.5 R20	56.7	HS DG	Hot	G	68,000	T	-
2) 252 SEVENTH ST. (I.D.L.)	2	3	NE/ SW	Heavily treed	1.7 R10	2.1 R12	57.6	HS DG	Nor.	F	68,000	T	P
3) 10 GIGNAC DR. (L.S.P.T.)	3	5	NW/ SE	Barren lot	1.7 R10	4.9 R28	60.9	HS DG	Nor.	P	96,000	T	P
4) 14 GIGNAC DR. (L.S.P.T.)	5	6	NW/ SE	Barren lot	1.7 R10	4.9 R28	55.3	HS DG	Nor.	P	96,000	T	G
5) 16 GIGNAC DR. (L.S.P.T.)	5	7	NW/ SE	Barren lot	1.7 R10	4.9 R28	57.5	HS DG	Hot	F	96,000	L	P
6) 22 GIGNAC DR. (I.D.L.)	2	3	NW/ SE	Barren lot	1.7 R10	4.9 R28	63	HS DG	Hot	F	68,000	L	P
7) 353 BORDEN CRES. (L.S.P.T.)	3	5	S/ N	Barren lot	1.7 R10	2.1 R12	61.9	HS DG	Nor.	F	75,000	T	P
8) 294 YONGE ST. (L.S.P.T.)	4	5	SW/ NE	Heavily treed	1.7 R10	2.1 R12	50.2	HS DG	Nor.	F	84,000	T	G

NOTES: 1) Denotes the following abbreviations :

- I.D.L. (Induct Limiter)
- L.S.P.T. (Limiting Set Point Thermostat)
- H.S. (Horizontal Slider)
- D.G. (Double Glazed)
- Nor. (Normal)
- G (Good)
- F (Fair)
- P (Poor)
- T (Taut)
- L (Loose)

APPENDIX IX

ENERGY AUDIT SURVEY RESULTS

ADDRESS:

- 818 DOMINION AVENUE

TYPE OF LIMITER:

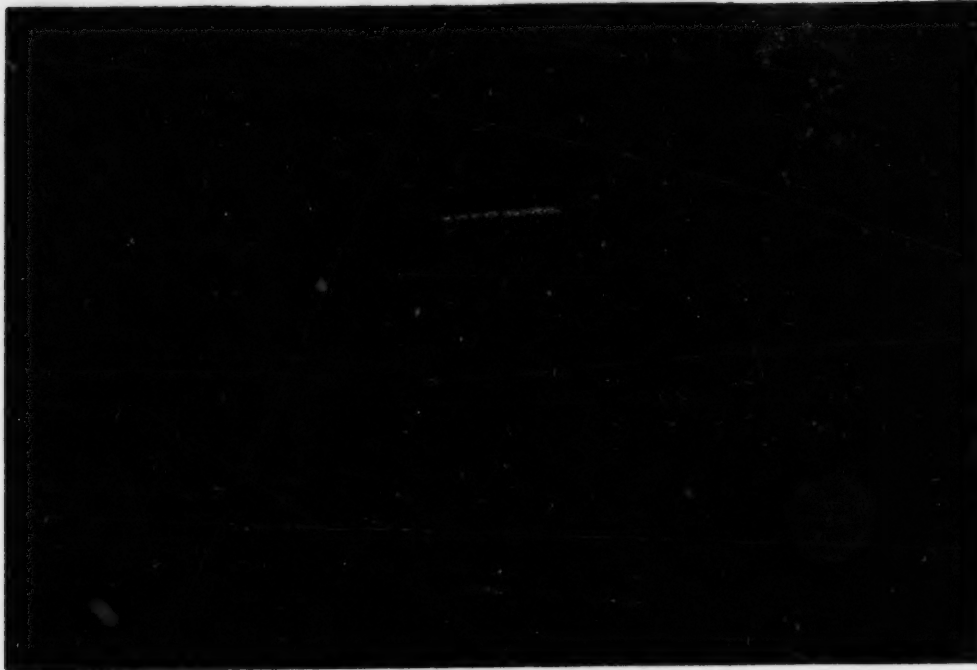
- IN-DUCT LIMITER

Observations:

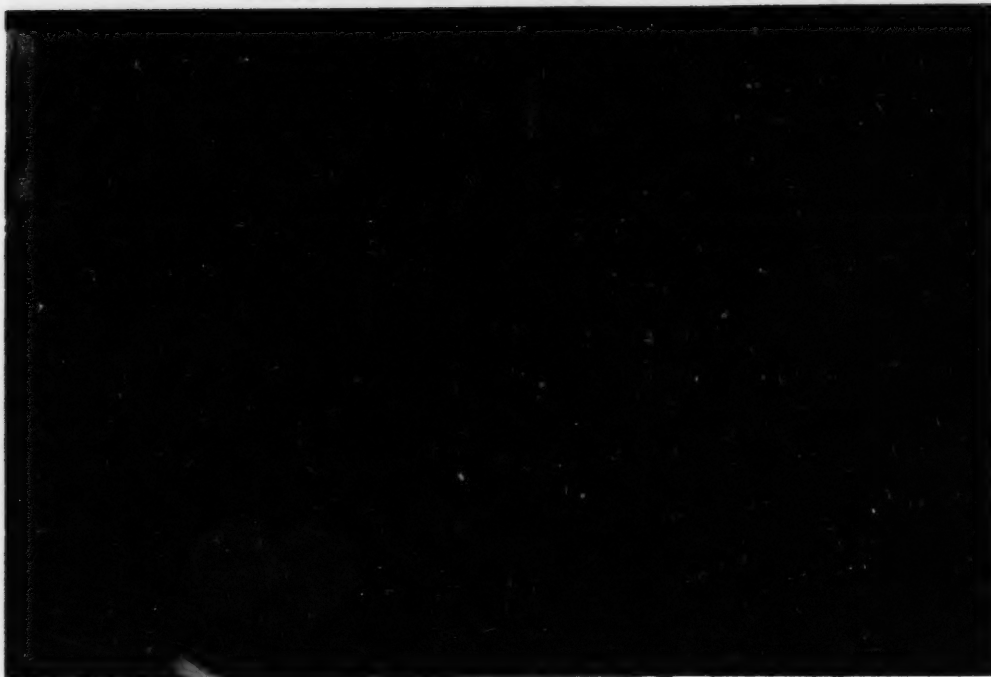
- 3 bedroom, 3 people
- orientation - front-east, back-west
side-north, common-south
- heavily treed corner lot (deciduous primarily)
- mature suburban neighbourhood
- insulation in the walls - RS1 1.7, R10 (3" fiberglass)
- insulation in the ceiling - RS1 3.5, R20 (6" fiberglass)
- single glaze sliders in basement (poor seal)
- double glaze sliders, main and second floors
- hot water heater thermostat set at "hot"*
- D.H.W. temperature 56.7°C
- furnace fan belt taut
- furnace filter clean
- furnace size 68.000 B.T.U.
- no evidence of leaky taps
- disconnected dryer vent pipe left open

*There is usually a high build-up on the heating element of the hot water heater due to the very hard water.

818 DOMINION AVENUE



FRONT



REAR

Address:

- 252 SEVENTH AVENUE

Type of Limiter:

IN-DUCT LIMITER

OBSERVATIONS:

- 2 bedroom, 3 people
- orientation - front-northeast, back-southwest
side-northwest, common-southeast
- heavily treed lot (deciduous primarily)
- mature suburban neighbourhood
- insulation in the walls - RS1 1.7, R10 (3" fiberglass)
- insulation in the ceiling- RS1 2.1, R12 (3½" fiberglass)
- cathedral ceiling
- single glaze sliders in basement
- double glaze sliders main and second floors
- hot water heater thermostat set at "normal"*
- D.H.W. temperature 57.6°C
- furnace for belt taut
- furnace filter fairly clean
- furnace size 68,000 B.T.U.
- no evidence of leaky taps
- a number of smallish pets

* - There is usually a high build-up on the heating element of the hot water heater due to the very hard water.

Address:

- 10 GIGNAC DRIVE

Type of Limiter:

Set Point Thermostat

OBSERVATIONS:

- 3 bedroom, 5 people
 - orientation - front-northwest, back-southeast
side-southwest, common-northeast
 - barren lot, backs on open field
 - insulation in the walls - RS1 1.7, R10 (3" fiberglass)
 - insulation in the ceiling - RS1 4.9, R28 (8" fiberglass)
 - single glaze sliders in basement
 - double glaze sliders main and second floors
 - hot water heater thermostat set at "normal"*
 - D.H.W. temperature 60.9°C
 - furnace for belt taut
 - furnace filter plugged
 - furnace size 96,000 B.T.U.
 - leaky bathtub faucet (hot)
 - window missing in basement (wire mesh shutter)
- * - There is usually a high build-up on the heating element of the hot water heater due to the very hard water.

10 GIGNAC DRIVE



FRONT



REAR

Address:

- 14 GIGNAC DRIVE

Type of Limiter: Set Point Thermostat

OBSERVATIONS:

- 5 bedroom, 6 people
- orientation - front-northwest, back-southeast
side -southwest, common-northeast
- barren lot, backs on woods 50 ft. from the house (coniferous)
- insulation in the walls - RS1 1.7, R10 (3" fiberglass)
- insulation in the ceiling - RS1 4.9, R28 (8" fiberglass)
- single glaze sliders in basement
- double glaze sliders, main and second floors
- hot water heater thermostat set at "normal"
- D.H.W. temperature 55.3°C.
- furnace fan belt taut
- furnace filter plugged
- furnace size 96,000 B.T.U.
- leaky bathtub faucet (hot)
- few bedrooms very drafty
- freezing pipes in winter
- relatively clean home.

- * - There is usually a high build-up on the heating element of the hot water heater due to the very hard water.

Address:

- 16 GIGNAC DRIVE

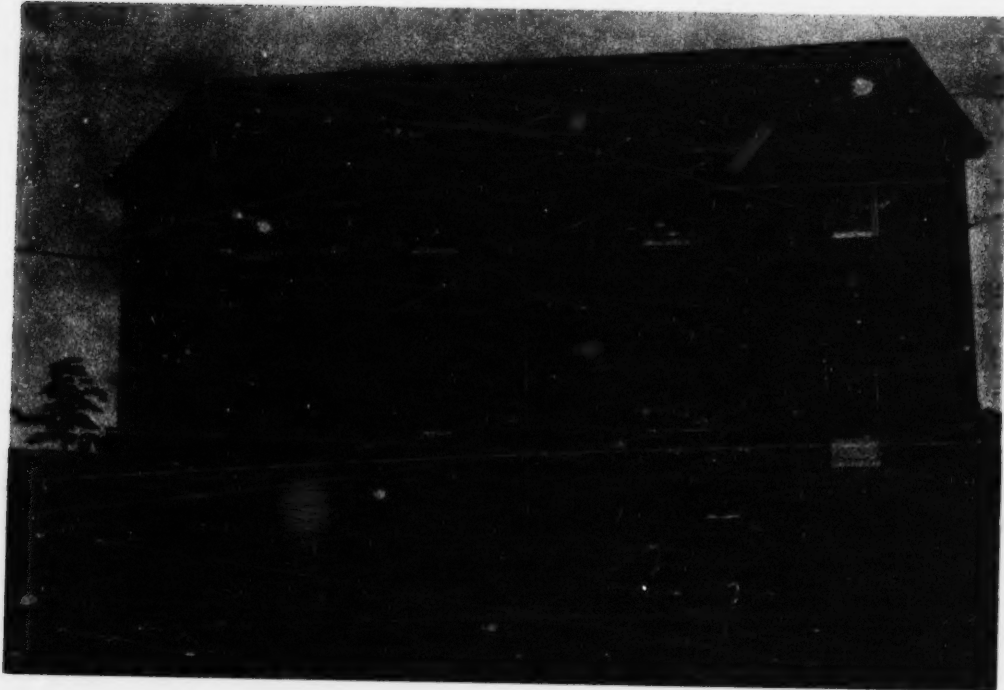
Type of Limiter: Set Point Thermostat

OBSERVATIONS:

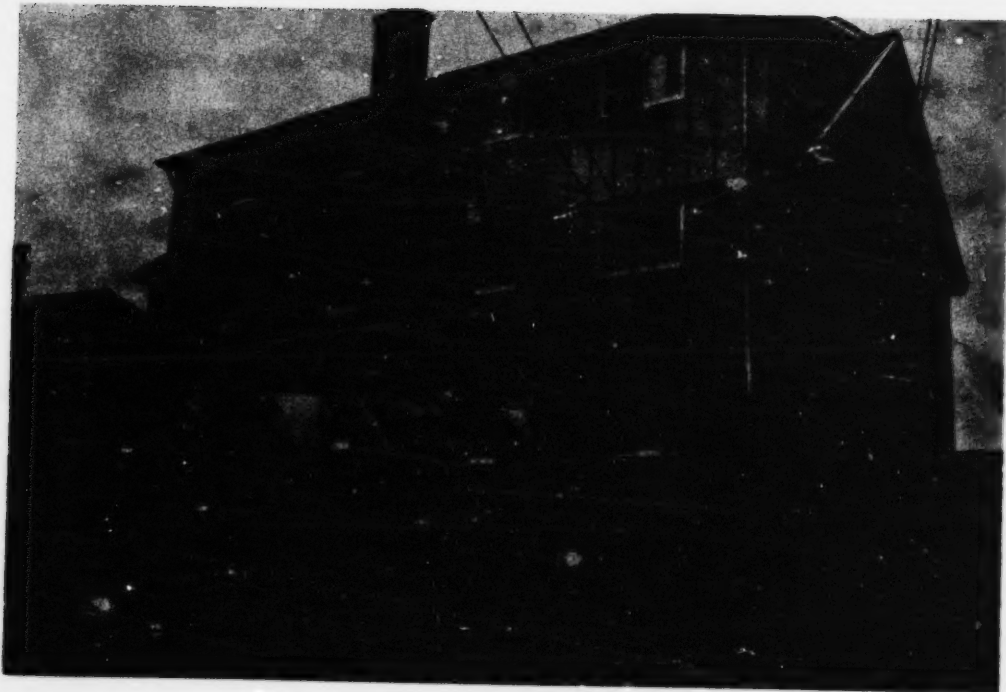
- 5 bedroom, 7 people
- orientation - front-northwest, back-southeast
side -northeast, common-southwest
- barren lot, backs on woods 50 ft. from house (coniferous)
- insulation in the walls RS1 1.7, R10 (3" fiberglass)
- insulation in the ceiling RS1 4.9, R28 (8" fiberglass)
- single glaze sliders in basement
- double glaze sliders, main and second floors
- hot water heater thermostat set at "hot"*
- D.H.W. temperature 57.5°C.
- furnace fan belt is loose
- furnace filter fairly clean
- furnace size, 96,000 B.T.U.
- leaky tap faucet upstairs bathroom sink (cold)
- a number of pets.

* - There is usually a high build-up on the heating element of the hot water heater due to the very hard water

14 and 16 GIGNAC DRIVE



FRONT



REAR

Address:

- 22 GIGNAC DRIVE

Type of Limiter:

Set Point Thermostat

OBSERVATIONS:

- 2 bedroom, 2-3 people
- orientation - front-northwest, back-southeast
side-southwest, common-northeast
- barren lot, backs on open field
- insulation in the walls RS1 1.7, R10 (3" fiberglass)
- insulation in the ceiling RS1 4.9, R28 (8" fiberglass)
- single glaze sliders in basement
- double glaze sliders, main and second floors
- hot water heater thermostat set at "hot"*
- D.H.W. temperature 63°C
- furnace fan belt is loose
- furnace filter fairly clean
- furnace size 68,000 B.T.U.
- leaky bathtub faucet (hot), leaky kitchen faucet (hot)
- extra room constructed in the basement

- * - There is usually a high build-up on the heating element of the hot water heater due to the very hard water.

22 GIGNAC DRIVE



FRONT



Address:

- 353 BORDEN CRESCENT

Type of Limiter: Set Point Thermostat

OBSERVATIONS:

- 3 bedroom, 5 people
- orientation, front-south, back-north
side-west, common-east
- barren lot, backs on school yard
- insulation in the walls RSl 1.7, R10 (3" fiberglass)
- insulation in the ceiling RSl 2.1, R12 (3½" fiberglass)
- single glaze sliders in basement
- double glaze sliders main floor
- hot water heater thermostat set at "normal"*
- D.H.W. temperature 61.9°C.
- furnace fan belt taut
- furnace filter is fairly clean
- furnace size 75,000 B.T.U.
- relatively dirty home

- * - There is usually a high build-up on the heating element of the hot water heater due to the very hard water.

353 BORDEN CRESCENT



FRONT



REAR

Address:

- 294 YONGE STREET

Type of Limiter:

Set Point Thermostat

OBSERVATIONS:

- 4 bedroom, 5 people
- orientation - front-southwest, back-northeast
side-northwest, shared-southeast
- heavily treed lot (deciduous)
- mature suburban neighbourhood
- insulation in the walls RSl 1.7, R10 (3" fiberglass)
- insulation in the ceiling RSl 2.1, R12 (3½" fiberglass)
- single glaze sliders in the basement
- double glaze sliders main floor
- hot water heater thermostat set at "normal"*
- D.H.W. temperature 50.2°C
- furnace fan belt taut
- furnace filter fairly clean
- furnace size 84,000 B.T.U.
- relatively clean home.

- * - There is usually a high build-up on the heating element of the hot water heater due to the very hard water.

294 YONGE STREET



FRONT



REAR

